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EXAMINER	
ARCIERO, ADAM A	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
10/20/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/574,032	SHIMAMURA ET AL.	
	Examiner	Art Unit	
	ADAM A. ARCIERO	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _27 June 2008_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-29_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-29_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The Amendment filed June 27, 2008 has been entered and fully considered. Claims 1-29 remain pending in the application. Claims 20-29 are newly presented. Claims 1-13 and 15-17 have been amended. The 35 USC 102(b) rejections and the 35 USC 103(a) rejections with NAGASUBRAMANIAN et al. as the primary reference in the previous office action are maintained. The 35 USC 102(b) and the 35 USC 103(a) rejections with HONG et al. as the primary reference in the previous office action are maintained. Claims 1-29 are finally rejected for the reasons given below.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 2, 4, 6, 8-10 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A).

As to Claims 1, 6 and 8, NAGASUBRAMANIAN et al. discloses a solid state lithium battery **12** which comprises an anode **14**, a composite solid electrolyte film **10** and a cathode **16** (col. 4, lines 50-61 and as shown in FIG. 7). The composite solid electrolyte film **10** comprises a polyelectrolyte such as polyethylene oxide (PEO), a lithium salt, and small sized, inorganic particles such as alumina (AL_2O_3), which is an inorganic oxide, (col. 4, line 62 to col. 5, line

12). It is inherent that all particles are individual particles. A uniform suspension of lithium iodide salt coated alumina particles is produced (electrolytes occupying at least some of the interstitial spaces) (col. 5, lines 52-55).

As to Claim 2, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein the individual insulating particles (on the composite solid electrolyte film **10**) are placed between the cathode **16** and the anode **14** so that the facing sides of the cathode **16** and the anode **14** do not contact each other, as can be seen in Figure 7 below.

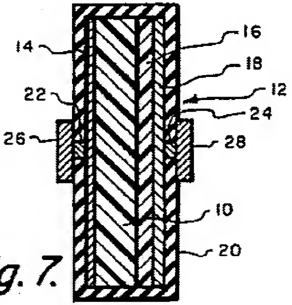


Fig. 7

As to Claim 4, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein a composite solid electrolyte film was prepared with alumina with a particle size of 0.30 microns (col. 5, lines 35-46).

As to Claim 9, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein the cathode comprises a cathode active material which is formed using lithium transition metal composite oxides and wherein the anode comprises an anode active material that is formed using lithium ions in carbon (col. 1, lines 54-57).

As to Claims 10 and 13, amounts of LiI, alumina (insulating particles) and PEO (electrolytic polymer) were separately weighed. LiI was dissolved in acetonitrile and the solution decanted. Alumina was then added to the solution and stirred. Isopropyl alcohol (IPA) was then added and stirred well. Acetonitrile was then added with some more IPA. PEO (electrolytic polymer) was slowly added while being stirred. A suspension was produced and the mixture was stirred over night to dissolve the PEO and was then cast into films (electrolyte layer) (col. 5, lines 35-55). This teaches that the insulating particles and electrolytic polymer were applied separately to form a composite solid electrolytic film. The alumina insulating particles inherently have spaces in between to hold the electrolytic polymer. The electrolyte layer is layered between a cathode and an anode, which are facing each other, as shown in FIG. 7 above.

4. Claims 17-19 are rejected under 35 U.S.C. 102(b) as being anticipated by KEJHA (US Patent No. 6,080,511).

As to Claims 17-19, KEJHA discloses a lithium ion polymer battery **10** with a cathode material **12** having an additional layer **14** of solid state polymeric

electrolyte composite applied there (col. 3, lines 1-3). Said polymeric electrolyte composite (electrolyte layer) includes an electrically nonconductive woven glass fiber net **15**, wherein said glass fiber net comprises individual insulating particles having interstitial spaces (insulating particles, first coating), said net **15** is dip coated with polymeric material **17** such as polyethylene oxide (PEO) and an ester (electrolytic polymer, second coating). An additional layer **18** of an anode material is applied on top of said electrolyte layer, sandwiching the electrolyte layer between the anode and cathode (col. 3, lines 1-14 and Fig. 1). As seen below in Figure 1, the cathode and anode are facing each other, wherein lithium ions can be inserted into and removed from the cathode and the anode through the electrolyte layer (col. 2, lines 64-67).

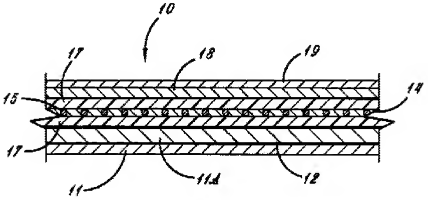


Fig. 1

5. Claims 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over KEJHA (US Patent No. 6,080,511) as applied to claim 17 above, and further in view of SPEAKMAN (WO 99/19900 A2).

As to Claim 28, KEHJA does not expressly disclose wherein the individual insulating particles and electrolyte are arranged in a pattern.

However, SPEAKMAN teaches that conducting polymers have a multitude of applications which are further enhanced by the ability of ink-jet printing in applications such as catalysts and electrodes (pg. 22, lines 7-20). SPEAKMAN further teaches that ink-jet printing provides a directly written pattern of the material being supplied.

Therefore, at the time of the invention, a person having ordinary skill in the art would have found it obvious to apply the individual insulating particles and electrolyte polymer of KEJHA by means of ink-jet printing so as to provide the material in a directly written patterned layer which enhances certain properties such as surface texture (pg. 7, lines 5-12), as suggested by SPEAKMAN.

As to Claim 29, the combination of KEJHA in view of SPEAKMAN does not expressly disclose the patterns claimed by the applicant. However, the courts have held that the configuration of the pattern is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed patterns was significant, *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (MPEP 2144.01).

6. Claims 1, 2, 5, 6, 8-10, 12, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by HONG et al. (WO 03/065481 A).

As to Claims 1, 2, 6 and 8, HONG et al. discloses a lithium ion battery comprising a cathode, an anode, and a separation membrane installed between the anode and cathode (pg. 6, lines 6-12). Said separation membrane includes an inorganic filler (individual insulating particles) such as silica or alumina (inorganic oxides) (pg. 8, lines 16-19). It is inherent that all particles are individual particles.

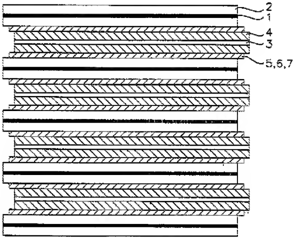
As to Claims 5 and 14, the thickness of the completed separation membrane polymer is created to be from 1-2 microns (pg. 17, lines 7-8). A roller having elastic rubber was used on the separation membrane comprising the polymer layer to improve the thick thickness problem (pg. 17, lines 6-10).

As to Claim 9, the anode comprises an anode active material of which is formed using a lithium transition metal oxide such as $LiCoO_2$ (pg. 4, line 6-8), and wherein the cathode comprises a cathode active material that is formed using synthetic or natural graphite (pg. 14, lines 3-6).

As to Claims 10 and 12, HONG et al. discloses an electrochemical cell comprising an anode and a cathode with a separation membrane installed between said anode and cathode (Abstract). The separation membrane was manufactured by apply the individual insulating particles (silica) and an electrolytic polymer (PVdF) simultaneously to form a polymer layer which was then compressed on the woven separation membrane (pg. 16-17, example 1) placed between said anode and cathode.

As to Claim 15, HONG et al. discloses a stack of lithium secondary batteries in the form of a stacked mono cell including a separation membrane as discussed in claim 1 above. FIG. 4 (shown below) shows a cathode comprising a current collector **1** and a cathode active material **2** and an anode comprising a current collector **3** and an anode active material **4** which are attached together by a polymer binder **6** (pg. 16, lines 12-17). The polymer separation membrane (not labeled) is formed on the supporting body of the separation membrane (not labeled) is attached between the cathode and anode (pg. 16, lines 17-19).

FIG. 4



Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

> the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A) in view of MUNSHI (US Patent No. 6,645,675 B1).

As to Claim 3, the disclosure of NAGASUBRAMANIAN et al. as discussed above is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the void ratio of the interstitial spaces to the individual insulating particles in the electrolyte layer.

However, MUNSHI teaches that in producing the polymer electrolyte film, after a mixture of a base polymer material with a lithium salt is dissolved in an organic solvent, the inorganic filler of silica or alumina is dispersed with a concentration in the range of 0.1-60% by volume of the final composition (col. 18, line 65-col. 19, line 5). A finely dispersed lithium ion conducting material is added in a concentration of about 0.1-80% by volume of the final composition (col. 19, lines 8-10). This concentration corresponds to the void ratio of the interstitial spaces to the insulating particles in the electrolyte layer claimed in claim 3. The void

spaces created by the inorganic filler (insulating particles) is equal to the volume occupied the lithium ion conducting material so as to further increase the conductivity, as suggested by MUNSHI (col. 18, lines 30-31). At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the amount of inorganic filler in the composite solid electrolyte film of NAGASUBRAMANIAN et al. so that a void ratio of 0.1-80% of the interstitial spaces to the insulating particles can be obtained so that the conductivity can be further increased, as taught by MUNSHI (col. 18, lines 30-31). Also, according to MPEP 2144.05 [R-5], the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists [*In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)]. Also, according to MPEP 2144.05, "differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical". "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

As to Claim 7, the disclosure of NAGASUBRAMANIAN et al. as discussed above in claim 1 is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the battery according to claim 1 wherein the individual insulating particles comprise olefin resins.

However, MUNSHI teaches a state of the art lithium ion battery using a carbon electrode as the anode and a lithiated metal oxide as the cathode. A microporous separator of polypropylene or polyethylene (olefin resin) is used for separating the two electrodes, with an electrolyte comprised of a lithium salt and a liquid organic solvent usually absorbed into said separator (col. 1, lines 43-54).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute a microporous separator comprising a polyolefin resin such as polyethylene, as taught by MUNSHI, for the composite solid electrolyte film comprising alumina as inorganic fillers of NAGASUBRAMANIAN et al., because polyethylene is well known for being a great insulator for the electrodes and absorber of electrolyte for lithium-ion batteries and the substitution of one known element (separator comprising an olefin resin) for another (separator comprising alumina) would have yielded the predictable results.

10. Claims 5, 12, 14 and 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A) in view of HONG et al. (WO 03/065481 A).

As to Claims 5 and 14, the disclosure of NAGASUBRAMANIAN et al. as discussed above in claims 1 and 10 is incorporated herein.

NAGASUBRAMANIAN et al. does not expressly disclose the thickness of the electrolyte layer as being 10 microns or less.

However, HONG et al. discloses the thickness of the completed separation membrane polymer is created to be from 1-2 microns (pg. 17, lines 7-8). A roller having elastic rubber was used on the separation membrane comprising the polymer layer to improve the thick thickness problem (pg. 17, lines 6-10).

At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the method of making the composite solid electrolyte film of NAGASUBRAMANIAN et al. with the roller of HONG et al. so a desired thickness of 1-2 microns can be obtained, as suggested by HONG et al. (pg. 17, lines 6-10), so that a much thinner and lighter weight battery that takes up a smaller amount of space may be obtained.

As to Claim 12, NAGASUBRAMANIAN et al. does not expressly disclose the method of applying the individual insulating particles and electrolytic polymer simultaneously.

However, HONG et al. discloses an electrochemical cell comprising an anode and a cathode with a separation membrane installed between said anode and cathode (Abstract). The separation membrane was manufactured by apply the insulating particles (silica) and an electrolytic polymer (PVdF) simultaneously to form a polymer layer which was then compressed on the woven separation membrane (pg. 16-17, example 1) placed between said anode and cathode.

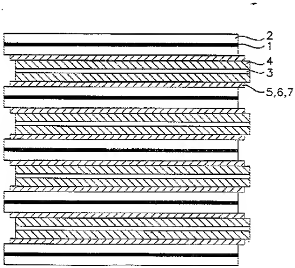
At the time of the invention, a person having ordinary skill in the art would have found it obvious to have a mixture of the insulating particles and electrolytic layer applied simultaneously instead of separately to achieve the same product, as

suggested by HONG et al. (pg. 16 and 17, example 1) in order to increase production efficiency.

As to Claim 15, NAGASUBRAMANIAN et al. does not expressly disclose a battery assembly comprising multiple connected batteries.

However, HONG et al. discloses a stack of lithium secondary batteries in the form of a stacked mono cell including a separation membrane as discussed in claim 1 above. FIG. 4 (shown below) shows a cathode comprising a current collector **1** and a cathode active material **2** and an anode comprising a current collector **3** and an anode active material **4** which are attached together by a polymer binder **6** (pg. 16, lines 12-17). The polymer separation membrane (not labeled) is formed on the supporting body of the separation membrane (not labeled) is attached between the cathode and anode (pg. 16, lines 17-19).

FIG. 4



At the time of the invention, a person having ordinary skill in the art would have been motivated to stack the battery arrangement of NAGASUBRAMANIAN et al. as taught by HONG et al. in order to obtain a battery system which outputs more voltage depending on the voltage needs of the battery application.

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of NAGASUBRAMANIAN et al. and HONG et al. as applied to claim 15 above, and further in view of TRIPLETT (US Patent No. 3,566,985).

As to Claim 16, the disclosure of the combination of NAGASUBRAMANIAN et al. and HONG et al. as discussed in claim 15 above is incorporated herein. The combination does not expressly disclose the battery assembly as being capable for powering a vehicle.

However, TRIPLETT teaches an electric vehicle driven by an electric motor which is powered by a DC battery having a plurality of cells (battery assembly) (Abstract).

At the time of the invention, a person having ordinary skill in the art would have found it obvious and been motivated to incorporate the battery assembly of the combination of NAGASUBRAMANIAN et al. and HONG et al. into a vehicle to power said vehicle, as suggested by TRIPLETT (Abstract) because a battery is a clean power source instead of using an internal combustion engine.

12. Claims 11 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A) as applied to claims 1 and 10, and in further view of SPEAKMAN (WO 99/19900 A2).

As to Claim 11, the disclosure of NAGASUBRAMANIAN et al. as discussed above is incorporated herein. NAGASUBRAMANIAN et al. does not expressly disclose the method for applying the individual insulating particles and the electrolytic polymer for forming the electrolyte layer, by an ink-jet printing nozzle.

However, SPEAKMAN teaches that conducting polymers have a multitude of applications which are further enhanced by the ability of ink jet printing in applications such as catalysts and electrodes (pg. 22, lines 7-20). At the time of the invention, a person having ordinary skill in the art would have recognized that ink jet printing is well known in the art and that person would have been motivated to apply the insulating particles and electrolytic polymer by means of ink jet printing because ink jet printing provides a directly written pattern onto a wide variety of surfaces, as suggested by SPEAKMAN (pg. 22, lines 7-10).

As to Claims 20 and 22, NAGASUBRAMANIAN et al. does not expressly disclose wherein the individual insulating particles and electrolyte are arranged in a pattern.

However, SPEAKMAN teaches of an ink-jet printing method for enhancing the placement of conducting polymers. (pg. 22, lines 7-20). SPEAKMAN further

teaches that ink-jet printing provides a directly written pattern of the material being supplied.

Therefore, at the time of the invention, a person having ordinary skill in the art would have found it obvious to apply the individual insulating particles and electrolyte polymer of NAGASUBRAMANIAN et al. by means of ink-jet printing so as to provide the material in a directly written patterned layer which enhances certain properties such as surface texture (pg. 7, lines 5-12), as suggested by SPEAKMAN.

As to Claims 21 and 23, the combination of NAGASUBRAMANIAN et al. in view of SPEAKMAN does not expressly disclose the patterns claimed by the applicant. However, the courts have held that the configuration of the pattern is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed patterns was significant, *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (MPEP 2144.01).

13. Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of MUNSHI (US Patent No. 6,645,675 B1).

As to Claim 3, the disclosure of HONG et al. as discussed above is incorporated herein. HONG et al. does not expressly disclose the void ratio of the interstitial spaces to the individual insulating particles in the electrolyte layer.

However, MUNSHI teaches that in producing the polymer electrolyte film, after a mixture of a base polymer material with a lithium salt is dissolved in an organic solvent, the inorganic filler of silica or alumina is dispersed with a concentration in the range of 0.1-60% by volume of the final composition (col. 18, line 65-col. 19, line 5). A finely dispersed lithium ion conducting material is added in a concentration of about 0.1-80% by volume of the final composition (col. 19, lines 8-10). This concentration corresponds to the void ratio of the interstitial spaces to the insulating particles in the electrolyte layer claimed in claim 3. The void spaces created by the inorganic filler (insulating particles) is equal to the volume occupied the lithium ion conducting material so as to further increase the conductivity, as suggested by MUNSHI (col. 18, lines 30-31). At the time of the invention, a person having ordinary skill in the art would have been motivated to modify the amount of inorganic filler in the electrolyte layer of HONG et al. so that a void ratio of 0.1-80% of the interstitial spaces to the insulating particles can be obtained so that the conductivity can be further increased, as taught by MUNISHI (col. 18, lines 30-31). Also, according to MPEP 2144.05 [R-5], the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists [*In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)]. Also, according to MPEP 2144.05, "differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical". "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or

workable ranges by routine experimentation," (*In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

As to Claim 7, the disclosure of HONG et al. as discussed above in claim 1 is incorporated herein. HONG et al. does not expressly disclose the battery according to claim 1 wherein the individual insulating particles comprise olefin resins.

However, MUNSHI teaches a state of the art lithium ion battery using a carbon electrode as the anode and a lithiated metal oxide as the cathode. A microporous separator of polypropylene or polyethylene (olefin resin) is used for separating the two electrodes, with an electrolyte comprised of a lithium salt and a liquid organic solvent usually absorbed into said separator (col. 1, lines 43-54).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute a microporous separator comprising a polyolefin resin such as polyethylene, as taught by MUNSHI, for the composite solid electrolyte film comprising alumina as inorganic fillers of HONG et al., because polyethylene is well known for being a great insulator for the electrodes and absorber of electrolyte for lithium-ion batteries and the substitution of one known element (separator comprising an olefin resin) for another (separator comprising alumina) would have yielded the predictable results.

14. Claims 4 and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of NAGASUBRAMANIAN et al. (US Patent No. 5,599,355 A).

As to Claim 4, the disclosure of HONG et al. as discussed above is incorporated herein. However, HONG et al. does not expressly disclose the mean radius of the insulating particles as being in the range of 0.05-10 microns.

However, NAGASUBRAMANIAN et al. discloses the battery according to claim 1, wherein a composite solid electrolyte film was prepared with alumina with a particle size of 0.30 microns (diameter) (col. 5, lines 35-46).

At the time of the invention, a person having ordinary skill in the art would have been motivated to substitute the insulating particles comprising alumina with a particle size of 0.30 microns of NAGASUBRAMANIAN et al. in place of the alumina particles of HONG et al. into the separation membrane of HONG et al. in order to increase the electrical performance, as suggested by NAGASUBRAMANIAN et al. (col. 5, lines 64-67) of the composite solid electrolyte film while maintaining structural integrity, (col. 2, lines 20-21). Also, according to MPEP 2144.05, for example, "claim reciting thickness of a protective layer falling within a range of "50 to 100 Angstroms" considered *prima facie* obvious in view of the prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm (100 Angstroms)," [*In re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997)]. The court stated that "by stating that suitable protection is provided if the protective layer is about 100 Angstroms thick, the

prior art reference directly teaches the use of a thickness within applicant's claimed range." Also, according to MPEP 2144.05, *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382, "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."

As to Claim 13, HONG et al. does not expressly disclose the method according to claim 10, wherein the individual insulating particles and electrolytic polymer are applied separately to form a solid electrolyte battery.
However, NAGASUBRAMANIAN discloses a method wherein amounts of LiI, alumina (insulating particles) and PEO (electrolytic polymer) were separately weighed. LiI was dissolved in acetonitrile and the solution decanted. Alumina was then added to the solution and stirred. Isopropyl alcohol (IPA) was then added and stirred well. Acetonitrile was then added with some more IPA. PEO (electrolytic polymer) was slowly added while being stirred. A suspension was produced and the mixture was stirred over night to dissolve the PEO and was then cast into films (electrolyte layer) (col. 5, lines 35-55). This teaches that the insulating particles and electrolytic polymer were applied separately to form a composite solid electrolytic film. The electrolyte layer is layered between a cathode and an anode, which are facing each other, as shown in FIG. 7 above. At the time of the invention, a person having ordinary skill in the art would have found it obvious and well known in the art that the method of NAGASUBRAMANIAN et al. wherein the insulating particles and electrolytic

polymer may be applied individually as opposed to simultaneously can be substituted for the method used by HONG et al., wherein said particles and polymer were applied simultaneously, and obtain the same product.

Furthermore, the courts have held that the selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results, In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

15. Claims 11 and 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) as applied to claims 1, 10 and 15, and in further view of SPEAKMAN (WO 99/19900 A2).

As to Claim 11, the disclosure of HONG et al. as discussed above is incorporated herein. HONG et al. does not expressly disclose the method of forming the electrolyte layer is accomplished by applying the individual insulating particles and the electrolytic polymer through a nozzle of an ink-jet printer.

However, SPEAKMAN teaches that conducting polymers have a multitude of applications which are further enhanced by the ability of ink jet printing in applications such as catalysts and electrodes (pg. 22, lines 7-20). At the time of the invention, a person having ordinary skill in the art would have recognized that ink jet printing is well known in the art and that person would have been motivated to apply the insulating particles and electrolytic polymer by means of ink jet printing because ink jet printing provides a directly written pattern onto a wide variety of surfaces, as suggested by SPEAKMAN (pg. 22, lines 7-10).

As to Claims 20, 22 and 24, HONG et al. does not expressly disclose wherein the individual insulating particles and electrolyte are arranged in a pattern.

However, SPEAKMAN teaches of an ink-jet printing method for enhancing the placement of conducting polymers. (pg. 22, lines 7-20). SPEAKMAN further teaches that ink-jet printing provides a directly written pattern of the material being supplied.

Therefore, at the time of the invention, a person having ordinary skill in the art would have found it obvious to apply the individual insulating particles and electrolyte polymer of HONG et al. by means of ink-jet printing so as to provide the material in a directly written patterned layer which enhances certain properties such as surface texture (pg. 7, lines 5-12), as suggested by SPEAKMAN.

As to Claims 21, 23 and 25, the combination of HONG et al. in view of SPEAKMAN does not expressly disclose the patterns claimed by the applicant. However, the courts have held that the configuration of the pattern is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed patterns was significant, *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (MPEP 2144.01).

16. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of TRIPLETT (US Patent No. 3,566,985).

As to Claim 16, the disclosure of HONG et al. of a battery assembly as discussed above in claim 15 is incorporated herein. HONG et al. does not disclose that the battery assembly is capable of powering a vehicle.

However, TRIPLETT teaches an electric vehicle driven by an electric motor which is powered by a DC battery having a plurality of cells (battery assembly) (Abstract).

At the time of the invention, a person having ordinary skill in the art would have found it obvious and been motivated to incorporate the battery assembly of HONG et al. into a vehicle to power said vehicle, as suggested by TRIPLETT (Abstract) because battery power is a clean energy source instead of using an internal combustion engine.

17. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over HONG et al. (WO 03/065481 A) in view of TRIPLETT (US Patent No. 3,566,985) as applied to claim 16 above, and further in view of SPEAKMAN (WO 99/19900 A2).

As to Claim 26, the combination of HONG et al. in view of TRIPLETT does not expressly disclose wherein the individual insulating particles and electrolyte are arranged in a pattern.

However, SPEAKMAN teaches that conducting polymers have a multitude of applications which are further enhanced by the ability of ink-jet printing in applications such as catalysts and electrodes (pg. 22, lines 7-20). SPEAKMAN further teaches that ink-jet printing provides a directly written pattern of the material being supplied.

Therefore, at the time of the invention, a person having ordinary skill in the art would have found it obvious to apply the individual insulating particles and electrolyte polymer of HONG et al. by means of ink-jet printing so as to provide the material in a directly written patterned layer which enhances certain properties such as surface texture (pg. 7, lines 5-12), as suggested by SPEAKMAN.

As to Claims 21, 23 and 25, the combination of HONG et al. in view of TRIPLETT and in further view of SPEAKMAN does not expressly disclose the patterns claimed by the applicant. However, the courts have held that the configuration of the pattern is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed patterns was significant, *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (MPEP 2144.01).

Response to Arguments

18. Applicant's arguments filed June 27, 2008 have been fully considered but they are not persuasive.

19. Applicant argues on pg. 9 of the Remarks that NAGASUBRAMANIAN et al. teaches a method that cannot accomplish the arrangement of individual insulating particles with respect to the rejections of claim 1. Applicant further states that the salt coated on the inorganic particles of NAGASUBRAMANIAN et al. are inherently smaller than said insulating particles. It is the Examiner's position that the alumina particles of NAGASUBRAMANIAN et al. are individual insulating particles, and that when the

uniform suspension is formed with the electrolyte salt, which is inherently smaller than said alumina particles (as stated by the Applicant on pg. 9 of the Remarks), that the salt inherently falls into some of the interstitial spaces between of the larger alumina particles. And thus, arrangement of individual insulating particles is accomplished. Therefore these arguments are not found to be persuasive.

20. Applicant further argues that amended claim 10 overcomes the 35 USC 102(b) rejection of NAGASUBRAMANIAN et al. in that the method for manufacturing the battery does not teach of applying an arrangement of individual insulating particles having interstitial spaces therebetween. However, Examiner respectfully disagrees in that NAGASUBRAMANIAN et al. teaches of alumina (individual insulating particles) and PEO (electrolytic polymer) which are applied to form an electrolyte layer (col. 5, lines 35-55) wherein the alumina particles inherently have spaces between one another. This reads on the limitations of claim 10 and these arguments are not found to be persuasive.

21. Applicant further argues on pg. 10 of the Remarks against the NAGASUBRAMANIAN et al. rejection of claim 10 by stating that the prior art reference does not accomplish the placement of individual insulating particles. However, NAGASUBRAMANIAN et al. teaches the addition of alumina (individual insulating particles) and then an electrolytic polymer, PEO (col. 5, lines 35-55). Therefore, these arguments are not found to be persuasive.

22. Applicant argues on pg. 10 of the Remarks that the 35 USC 102(b) rejections using KEJHA as the reference does not read on the amended claim 17. More specifically, Applicant states that KEJHA fails to teach a method which applies individual insulating particles on a substrate with a first coating means and then applying

electrolyte within the interstitial spaces. KEJHA discloses a first coating of insulating particles and a second coating of polymeric material which fills in the interstitial spaces of the insulating material. Applicant further states that KEJHA does not use ink-jet, as disclosed in Applicant's specification. However, that limitation does not appear in claim 17. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., battery ink-jet printing) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

23. Applicant argues on pg. 11 of the Remarks that the 35 USC 102(b) rejections based on HONG et al. do not read on amended claim 1. Furthermore, Applicant states that HONG et al. fails to teach a cell element consisting of an electrolyte layer, cathode and anode with said electrolyte layer comprising individual insulating particles and electrolytes occupying at least some of a plurality of interstitial electrolytes between said insulating particles. Examiner respectfully disagrees because HONG et al. does in fact disclose a lithium ion battery having a cathode, anode and a separation membrane, wherein said membrane comprises individual insulating particles of silica or alumina and an electrolytic polymer wherein said electrolyte polymer occupies at least some of the interstitial spaces inherently present between said insulating particles. Therefore, Applicant's arguments are not found to be persuasive.

24. Applicant further argues on pg. 12 of the Remarks that Claim 1 excludes a separation membrane, however Claim 1 uses the terminology "comprising" which is open-ended. Therefore, Applicant's arguments are not found to be persuasive. Applicant

also argues with respect to amended claim 10, that HONG et al. does not teach an electrolytic polymer occupying at least some of the interstitial spaces between the individual insulating particles. However, HONG et al. teaches of the separation membrane having insulating particles (silica) and an electrolytic polymer (PVdF) simultaneously applied to a substrate (pg. 16-17, example 1). The electrolytic polymer would inherently occupy at least some of the interstitial spaces which are inherently present between the insulating particles of HONG et al. Therefore, these arguments are not found to be persuasive.

25. Applicant argues on pg. 13 of the Remarks that the 35 USC 103(a) rejections of NAGASUBRAMANIAN et al. in view of MUNSHI and HONG et al. in view of MUNSHI do not teach the limitations of claims 3 and 7. Furthermore, Applicant states that applying a solution with the methods disclosed in MUNSHI will not achieve applying individual insulating particles and electrolyte as disclosed in claim 1. However, MUNSHI is not used in combination to reject claim 1, and furthermore claims 1, 3 and 7 are not method claims for applying individual insulating particles and electrolyte. The Examiner is unsure as to what the Applicant is arguing with respect to claims 3 and 7 and is not persuaded by Applicant's arguments.

26. Applicant argues on pg. 14 of the Remarks that the 35 USC 103(a) rejections of claim 11 of NAGASUBRAMANIAN et al. in view of SPEAKMAN and HONG et al. in view of SPEAKMAN do not teach the limitations of claim 11. Furthermore, Applicant argues that there is no discussion of using ink jets to manufacture batteries to power vehicles. Claim 11 depends from claim 10, and there is no limitation of battery powered vehicles. In response to applicant's argument that the references fail to show certain

features of applicant's invention, it is noted that the features upon which applicant relies (i.e., battery powered vehicle) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore, Applicant states that SPEAKMAN discloses ink jet printing for active smart cards for banks, theatres, etc. However, Examiner clearly stated in the rejection of the previous office action that SPEAKMAN teaches of conducting polymers having a multitude of applications which are enhanced by methods of ink jet printing. Catalysts, electrodes and membranes are also listed under applications where ink jet printing is used for directly providing patterns (pg. 22, lines 7-20). Therefore, Applicant's arguments are not found to be persuasive.

Conclusion

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the

advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 8am to 5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AA
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